



Standard Test Method for On-Line Determination of Anions and Carbon Dioxide in High Purity Water by Cation Exchange and Degassed Cation Conductivity¹

This standard is issued under the fixed designation D 4519; the number immediately following the designation indicates the year of original adoption or, in the case of revision, the year of last revision. A number in parentheses indicates the year of last reapproval. A superscript epsilon (ε) indicates an editorial change since the last revision or reapproval.

^{ε1} NOTE—Footnotes were editorially removed in June 1999.

1. Scope

1.1 This on-line test method includes hydrogen exchange and degassing by boiling and provides means for determining anions (such as Cl^- , SO_4^{4-} , NO_3^- , and F^-) at levels as low as 2 µg/L (2 ppb) and carbon dioxide at the level of 0.01 to 10 mg/L (ppm) at 25°C in high purity water and steam condensate by measuring electrical conductivity.

1.2 The conductivity of all anions (except OH^-) is determined and not the conductivity of an individual anion if more than one is present. If only one anion is present (such as Cl^- or SO_4^{4-}), reference to Table 1 and Table 2 or Figs. 1-3 provides the chloride or sulfate and CO_2 concentration.

1.3 This test method has been improved in accuracy by using a modern microprocessor instrument for conductivity and temperature measurement and appropriate temperature compensation algorithms for compensation to 25°C.

1.4 *This standard does not purport to address all of the safety concerns, if any, associated with its use. It is the responsibility of the user of this standard to establish appropriate safety and health practices and determine the applicability of regulatory limitations prior to use.*

2. Referenced Documents

2.1 ASTM Standards:

D 1066 Practice for Sampling Steam²

D 1125 Test Methods for Electrical Conductivity and Resistivity of Water²

D 1129 Terminology Relating to Water²

D 1192 Specifications for Equipment for Sampling Water and Steam in Closed Conduits²

D 1193 Specification for Reagent Water²

TABLE 1 Increase in Conductivity of Pure Water Expressed as Chloride Ion or Sulfate Ion

Conductivity due to Chlorides	Concentration Chlorides (PPB)	Conductivity due to Sulfates	Concentration Sulfates (PPB)
0.0548	0.0	0.0548	0.0
0.0595	1	0.0608	1
0.0651	2	0.0669	2
0.0717	3	0.0732	3
0.0791	4	0.0797	4
0.0872	5	0.0862	5
0.0958	6	0.0929	6
0.1049	7	0.0997	7
0.1145	8	0.1066	8
0.1243	9	0.1137	9
0.1344	10	0.1208	10
0.2427	20	0.1969	20
0.3560	30	0.2780	30
0.4709	40	0.3616	40
0.5865	50	0.4455	50
0.7023	60	0.5320	60
0.8183	70	0.6181	70
0.9345	80	0.7044	80
1.0507	90	0.7909	90
1.1669	100	0.8775	100
2.2209	200	1.7470	200
5.8252	500	4.362	500

D 2186 Test Methods for Deposit-Forming Impurities in Steam³

D 2777 Practice for Determination of Precision and Bias of Applicable Methods of Committee D-19 on Water²

D 3370 Practices for Sampling Water from Closed Conduits²

D 3864 Guide for Continual On-Line Monitoring Systems for Water Analysis²

3. Terminology

3.1 **Definitions**—For definitions of terms used in this test method, refer to Test Methods D 1125 and Terminology D 1129.

¹ This test method is under the jurisdiction of ASTM Committee D-19 on Water and is the direct responsibility of Subcommittee D19.03 on Sampling of Water and Water-Formed Deposits, Surveillance of Water, and Flow Measurement of Water.

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² Annual Book of ASTM Standards, Vol 11.01.

³ Annual Book of ASTM Standards, Vol 11.02.

